1. A method for the production of α-L-aspartyl-L-phenylalanine (Asp-Phe) from the substrates L-aspartic acid (L-Asp) and L-phenylalanine (L-Phe) which comprises (a) contacting the substrates in the presence of an effective amount of adenosine-triphosphate (ATP), with a non-ribosomal dipeptide synthetase comprising two minimal modules connected by one condensation domain, wherein the N-terminal module of these minimal modules recognizes L-aspartic acid and the C-terminal module of these minimal modules ~~is~~ recognizes L-phenylalanine and is covalently bound at its N-terminal end to the condensation domain, and wherein each of these minimal modules is composed of an adenylation domain and a thiolation domain containing a 4'-phosphopantetheinyl cofactor, and (b) recovering the α-L-aspartyl-L-phenylalanine (Asp-Phe) produced in (a).

2. Method for the production of Asp-Phe according to claim 1, wherein the condensation domain in the dipeptide synthetase is also covalently bound to the module recognising L-aspartic acid.

3. Method for the production of Asp-Phe according to claim 1, wherein the non-ribosomal dipeptide synthetase further comprises a thioesterase releasing factor for the Asp-Phe formed.

4. Method for the production of Asp-Phe according to claim 3, wherein the condensation domain in the dipeptide synthetase is covalently bound to the module recognizing L-aspartic acid and wherein the thioesterase releasing factor is covalently bound to the module recognizing L-phenylalanine.

5. Method for the production of Asp-Phe according to claim 1, wherein a non-integrated protein with thioesterase Type-II activity is further present together with the dipeptide synthetase.

6. Method for the production of Asp-Phe according to claim 5, wherein the dipeptide synthetase is present in a microorganism, said process further comprising growing said

microorganism in a fermentor and feeding glucose, L-Asp, L-Phe, or mixtures thereof to said fermentor.

7. Method for the production of Asp-Phe according to claim 6, wherein the microorganism is first grown in a fermentor to reach a predetermined cell density before the expression of the Asp-Phe dipeptide synthetase is switched on, and wherein ~~feeding of the~~ glucose, L-Asp, L-Phe, or mixture thereof is added at the same time the expression ~~for the~~ of the Asp-Phe dipeptide is switched on.

8. Method for the production of Asp-Phe according to claim 7, wherein the microorganism is an L-phenylalanine producing microorganism, and only glucose and L-Asp are fed.

9. Method for the production of Asp-Phe according to claim 8, wherein the microorganism is an *Escherichia* or *Bacillus* species.

10. Method for the production of Asp-Phe according to claim 6, wherein the microorganism used is a strain having reduced protease activity for Asp-Phe or having no protease activity towards Asp-Phe.

11. Method for the production of Asp-Phe according to claim 1, wherein the production of Asp-Phe is carried out using the dipeptide synthetase in its isolated form in a reactor and simultaneously supplying L-Asp, L-Phe, or a mixture thereof and ATP to the reactor.

12. Method for the production of Asp-Phe according to claim 11, wherein the supply of ATP is provided in part by an in situ ATP-regenerating system.

13. Method for the production of Asp-Phe according to claim 12, wherein the ATP-regenerating system is present in a permeabilised microorganism.

14. A DNA fragment or a combination of DNA fragments coding for a non-ribosomal Asp-Phe dipeptide synthetase, said synthetase comprising two minimal modules connected by one condensation domain, wherein the N-terminal module of these minimal modules recognizes L-aspartic acid, and the C-terminal module of these minimal modules recognizes L-phenylalanine and is covalently bound at its N-terminal end to the condensation domain, and wherein each of said minimal modules is composed of an adenylation domain and a thiolation domain containing a 4'-phosphopantetheinyl cofactor.

15. A DNA fragment coding for an Asp-Phe dipeptide synthetase according to claim 14, wherein the condensation domain in the encoded dipeptide synthetase is also covalently bound to the module recognising L-aspartic acid.

16. A DNA fragment or a combination of DNA fragments according to claim 14, wherein the DNA fragment or the combination of DNA fragments encoding the dipeptide synthetase also code for a thioesterase releasing factor for the Asp-Phe formed on that dipeptide synthetase.

17. A DNA fragment according to claim 16, wherein the condensation domain in the dipeptide synthetase is covalently bound to the module recognizing L-aspartic acid and wherein the thioesterase releasing factor is covalently bound to the module recognizing L-phenylalanine.

18. A DNA fragment or a combination of DNA fragments according to claim 14, wherein said DNA fragment or a combination of DNA fragments also code for a non-integrated protein with thioesterase Type-II activity.

19. A recombinant microorganism containing a DNA fragment or a combination of DNA fragments according to claim 14.

20. A microorganism according to claim 19, wherein the microorganism is capable of producing L-Asp, L-Phe, or a mixture thereof.

21. A micro-organism according to claim 20, wherein the micro-organism is an *Escherichia coli* or *Bacillus* species.

22. Non-ribosomal Asp-Phe dipeptide synthetase comprising two minimal modules connected by one condensation domain, wherein the N-terminal module of these minimal modules recognizes L-aspartic acid and the C-terminal module of these minimal modules recognizes L-phenylalanine and is covalently bound at its N-terminal end to the condensation domain, and wherein each of these minimal modules is composed of an adenylation domain and a thiolation domain containing a 4'-phosphopantetheinyl cofactor.

23. Non-ribosomal Asp-Phe dipeptide synthetase according to claim 22, wherein the condensation domain in the dipeptide synthetase is also covalently bound to the module recognizing L-aspartic acid.

24. Non-ribosomal Asp-Phe dipeptide synthetase according to claim 22, wherein the dipeptide synthetase also comprises a releasing factor for the Asp-Phe formed on that dipeptide synthetase.

25. Non-ribosomal Asp-Phe dipeptide synthetase according to claim 24, wherein the condensation domain in the dipeptide synthetase is covalently bound to the module recognizing L-aspartic acid and wherein the releasing factor is covalently bound to the module recognizing L-phenylalanine.

26. A method for the production of α-L-aspartyl-L-phenylalanine (Asp-Phe) from the substrates L-aspartic acid (L-Asp) and L-phenylalanine (L-Phe) which comprises (a) contacting the substrates, in the presence of an effective amount of adenosine-triphosphate (ATP), with a non-ribosomal dipeptide synthetase comprising two minimal modules, one minimal module being encoded by DNA comprising part of the *srf*B gene from *B. subtilis* ATCC 21332 recognizing L-aspartic acid and the second minimal module being encoded by DNA comprising part of the *tyc*A gene from *B. brevis* ATCC 8185 recognizing L-phenylalanine, the two minimal modules being connected by one condensation domain, wherein the N-terminal module of these minimal modules recognizes L-aspartic acid and the

C-terminal module of these minimal modules recognizes L-phenylalanine and is covalently bound at its N-terminal end to the condensation domain, and wherein each of these minimal modules is composed of an adenylation domain and a thiolation domain containing a 4'-phosphopantetheinyl cofactor, and (b) recovering the α-L-aspartyl-L-phenylalanine (Asp-Phe) produced in (a).